

# PATENT ABSTRACTS OF JAPAN

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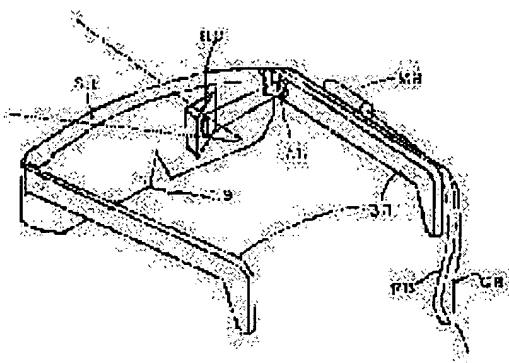
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 (22)Date of filing : **15.10.1996** (72)Inventor : **TAKEGAWA HIROSHI**

## (54) HEAD UP DISPLAY DEVICE WITH SOUND RECOGNIZING FUNCTION

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To attain a real time caption display device by spatially separating a device for converting a data signal into a picture from a picture display part, mutually connecting the conversion device and the display part through an optical fiber tube for transmitting data as a picture and displaying the picture on the display device.

**SOLUTION:** When a signal cable CB is connected to an optical fiber FB and a head up display(HUD) part of a HUD device is connected to a signal processing circuit part, a sound signal collected by a microphone MH fitted to the bow BO of glasses is inputted to a sound recognizing device in the signal processing part through the cable CB and the sound signal is converted into a character signal (text data) and the character signal is sent to an output terminal. The text data applied from the sound recognizing device to a picture signal conversion part are converted into a picture by a liquid crystal display device and the picture is applied to the surface of a diffusion plate by light from a light source. Light projected from the diffusion plate is reduced to the diameter length of the fiber FB and sent to the fiber FB.



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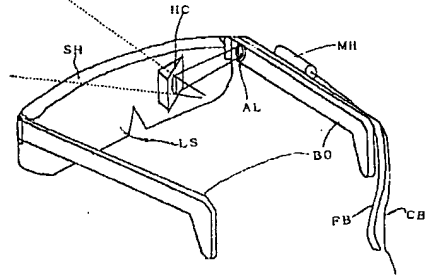
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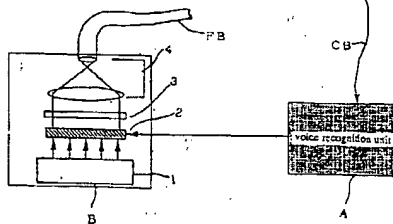
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## DRAWINGS

[Drawing 1]



[Drawing 2]

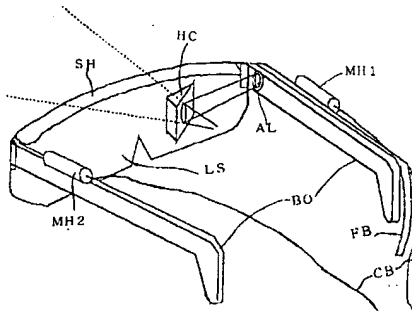


[Drawing 3]

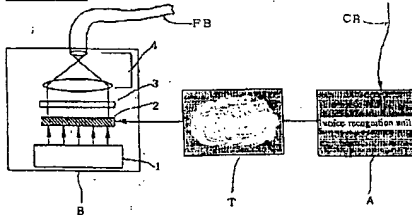
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[Drawing 4]



[Translation done.]

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the explanatory view showing the configuration of the HUD part of the HUD equipment with a speech recognition function of this invention.

[Drawing 2] It is the explanatory view showing the configuration of the digital-disposal-circuit part of the HUD equipment with a speech recognition function of this invention.

[Drawing 3] The generating location or direction of a sound source is specified as the HUD equipment with a speech recognition function of this invention, and it is the explanatory view showing the configuration of the HUD part of the equipment which added the shown function a table in text about this.

[Drawing 4] It is the explanatory view showing the configuration of the digital-disposal-circuit part used for the example of the equipment which displayed this invention as text by the language into which speech information was translated.

[Description of Notations]

LS ... Liquid crystal shutter AL [ HC ... Holographic combiner ] ... The lens for sight adjustment, BO ... Shank of glasses

MH ... Sound-collecting micro HOON MH1 ... Sound-collecting micro HOON

MH2 ... Sound-collecting micro horn CB ... Signal-transmission cable

FB ... Fiber-optic cable SH ... The shade of a spectacle lens

A ... Voice recognition unit T ... Translation equipment, B ... Image transformation section

1 ... Light source 2 ... Liquid crystal display 3 ... Diffusion plate

4 ... Contraction optical system

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DETAILED DESCRIPTION

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## [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention changes into the text data of the alphabetic character corresponding to voice the voice data which collected the sound with sound-collecting equipment, and relates to the HUD equipment with a speech recognition function which was made to carry out the real-time display of the text data on the display.

[0002]

[Problem(s) to be Solved by the Invention] Conventionally, the speech recognition technique had the main application as an alternative of a key input so that it might be represented by the voice input to a computer etc. In this invention, it is in realizing a real-time title display, as the voice of a foreign language is changed into the text of a native language by utilizing as a hearing-impaired person's communication tool, and incorporating automatic translation equipment as voice data is changed into alphabetic data and this is displayed on HUD equipment in the real time, and it displays by using this as voice data / an alphabetic character data converter.

[0003]

[Means for Solving the Problem] This invention separates from an image (alphabetic character) display the one section or all of the equipment which has sound-collecting equipment, changes into text data the voice data which collected the sound with sound-collecting equipment with a voice recognition unit, and changes into an image the data signal which carries out the real-time display of the alphabetic data on a space target, and realizes the \*\* HUD equipment which joins together using the optical fiber tube which performs the transfer by the image itself, and displays the meantime on a display unit.

[0004]

## [Embodiment of the Invention]

[Example] Drawing 1 is the explanatory view showing the configuration of the HUD part of the HUD equipment with a speech recognition function of this invention. The example of drawing 1 shows the example at the time of applying this invention to the HUD equipment of a glasses form. In drawing 1, LS is the liquid crystal shutter of a HUD.

[0005] BO holds glasses fixed to the face by hanging this part on a lug like the glasses usual with the shank of glasses. SH intercepts an excessive light from the upper part with the shade attached in the liquid crystal shutter of glasses, and raises the visibility of an image. MHs are the microphone of a sound-collecting important point, and a lens for sight adjustment in AL. HC is a holographic combiner, is the so-called RIPPUMAMBURAGGU volume hologram, and has reflected wave length selectivity and an augmentation operation (concave mirror function).

[0006] FB is an optical fiber which transmits an image. CB is a signal cable which transmits an electrical signal. The holographic combiner HC is attached in the liquid crystal shutter LS. The lens AL for sight adjustment and micro HOON MH are attached in the shank BO of glasses. An optical fiber FB is combined with the lens AL for sight adjustment, and the physical relationship of Lens AL and the holographic combiner HC is set up so that the picture signal transmitted in the optical fiber FB may be projected by the holographic combiner HC through Lens AL.

[0007] The microphone MH for sound-collecting collects the sound of the front face of HUD equipment, changes this into an electrical signal, and sends it out to a signal cable CB. Thus, the HUD part of HUD equipment has the function which collects the sound of the front face of the function to project the picture signal transmitted in the optical fiber FB on the holographic combiner HC, and HUD equipment, changes this into an electrical signal, and is sent out to a signal cable CB.

[0008] Drawing 2 is the explanatory view showing the configuration of the digital-disposal-circuit part of the HUD equipment with a speech recognition function of this invention. In drawing 2, A processes the output signal of the microphone impressed to the input terminal with a voice recognition unit, changes this into the text data signal corresponding to the voice, and sends it out to the meaning force terminal. B changes into an image the text data signal added to the input terminal by the picture signal transducer, and sends it out to an optical fiber FB. The picture signal transducer B is constituted by the light source 1, a liquid crystal display 2, the diffusion plate 3, and the contraction optical system for fiber coupling, and is.

[0009] An optical fiber FB connects with a signal cable CB, and the HUD part of drawing 1 and the digital-disposal-circuit part of drawing 2 process the output signal of the microphone sent from a HUD part in a digital-disposal-circuit part, change it into an image, and are sent out to an optical fiber FB. Thus, it is as follows when actuation of the HUD equipment with a speech recognition function of constituted this invention is explained.

[0010] If the user of HUD equipment carries equipment, connects an optical fiber FB with a signal cable CB and combines the HUD part and the digital-disposal-circuit section of HUD equipment, the sound signal collected with the microphone MH attached in the shank BO of glasses will be inputted into the voice recognition unit A of the digital-disposal-circuit section through a signal cable CB. A voice recognition unit A changes a sound signal into an alphabetic signal (text data), and sends it out to the output terminal.

[0011] Since the circuit which changes the sound signal of a voice recognition unit A into an alphabetic signal is the same as that of what is used for a current general one, a concrete circuit is omitted, but in order to perform real-time processing of the signal which does not have a time lag if possible on the property of this invention, it is required to use the circuit which can perform high-speed processing.

The text data of the alphabetic signal of the output of a voice recognition unit A is added to the input terminal of the picture signal transducer B, is changed into an image, and is sent out to an optical fiber FB.

[0012] The concrete actuation of the picture signal transducer B is as follows. The text data of the voice recognition unit A added to the picture signal transducer B is changed into an image by the liquid crystal display 2. The image of a liquid crystal display 2 is irradiated on the diffusion plate 3 by the light of the light source 1. The diffusion plate 3 is used, in order that the noise of the image of a liquid crystal display 2 may be removed and a user may enable it to see a good image. The contraction optical system 4 for fiber coupling contracts to the magnitude of the path of an optical fiber FB, and the light which carried out outgoing radiation of the diffusion plate 3 is sent out to an optical fiber FB.

[0013] As an optical fiber FB, the plastics fiber in which a cross section has the core configuration which carried out the rectangle of 4:3 is used by this example. Dimension  $\phi 3.2\text{mm}$  and path of 1 one fiber  $\phi 12\text{micrometer}$  and resolution It changes with 60 lp/mm. After focus adjustment is carried out with the lens AL for sight adjustment attached in the shank BO of the glasses of a HUD part, incidence of the image conducted with the optical fiber FB is carried out to holographic KOSHIBAINA HC. This holographic combiner is the so-called RIPPUMAMBURAGGU volume hologram, and has reflected wave length selectivity and an augmentation operation (concave mirror function).

[0014] This hologram reflects only specific wavelength in a certain include-angle direction, and has the description of penetrating, about other spectrums. For this reason, an observer can also see the vision information on surrounding to coincidence, looking at the image of a liquid crystal display in one color (for example, green). However, the spectrum of the transmitted light lacks the green color.

Moreover, an image only with the core size of the plastics fiber of an optical fiber FB is expandable to an observer to visual field sufficient by showing a virtual image with an augmentation operation of a RIPPUMAMBURAGGU volume hologram.

[0015] As the quality of the material of this holographic combiner, there is photopolymer DAIKURO mate gelatin etc., for example. The holographic combiner HC is attached in the liquid crystal shutter, and has controlled the strength of the vision information on surrounding by this liquid crystal shutter.

[0016] Drawing 3 specifies the generating location or direction of a sound source as the HUD equipment with a speech recognition function of this invention, and is the explanatory view showing the configuration of the HUD part of the equipment which added the shown function a table in an image and text about the location and a direction at the image display section. In drawing 3, the same sign is attached to the same part as drawing 1, and the explanation is omitted.

[0017] Although the difference of the HUD parts of drawing 3 and drawing 1 explained the example which used only one micro HOON for sound-collecting which collects the sound of the front face of HUD equipment with the equipment of drawing 1, it enables it to specify at least two the generating locations or directions of a sound source in the example of drawing 3, using micro HOON for sound-collecting two or more.

[0018] In drawing 3, the micro horn for sound-collecting in MH1 and MH2, and CB1 and CB2 are signal cables. The micro horn MH1 for sound-collecting is attached in the shanks alumnus1 and alumnus2 of right and left of the glasses of a HUD, respectively. The micro horns MH1 and MH2 for sound-collecting collect the sound of the front face of HUD equipment, change this into an electrical signal, send it out to signal cables CB1 and CB2, and are added to the voice recognition unit of drawing 2.

[0019] Since the generating location or direction of a sound source can be specified from two signals of micro HOON MH1 and MH2 in a voice recognition unit, a user can be told also about the direction of a sound source by displaying the location and a direction on the image display section with an image and text. When detection of the direction of a sound source increases the number of micro HOON for sound-collecting, specification of a more exact direction is attained.

[0020] Since a hearing-impaired person can know not only audio recognition but the direction of the \*\*\*\*, he can extend the function of a hearing-impaired person's handicap NYUKESHON further. Drawing 4 is the explanatory view showing the configuration of the digital-disposal-circuit part used for the example at the time of applying this invention to real-time title display HUD equipment. In addition, since a HUD part can use the thing of the same configuration as the example of HUD equipment with a speech recognition function, it omits the configuration and explanatory view.

[0021] In drawing 4, A processes the output signal of the micro horn impressed to the input terminal with a voice recognition unit, changes this into the text data signal corresponding to the voice, and sends it out to the output terminal. T has the function which translates into other language, for example, English, the language of the text data which is the text impressed to the input terminal with automatic translation equipment, for example, Japanese, and is sent out to the output terminal as text data which is text.

[0022] It is [0023] with required since the circuit which changes language with automatic translation equipment T into other language is the same as that of what is used for a current general one using the circuit which can perform high-speed processing in order to perform real-time processing of the signal which does not have a time lag if possible on the property of this invention although a concrete circuit is omitted. B changes into an image the text data signal added to the input terminal by the picture signal transducer, and sends it out to an optical fiber FB. The picture signal transducer B is constituted by the light source 1, a liquid crystal display 2, the diffusion plate 3, and the contraction optical system for fiber coupling, and is. An optical fiber FB connects with a signal cable CB, and the HUD part of drawing 1 and the digital-disposal-circuit part of drawing 2 process the output signal of the micro horn sent from a HUD part in a digital-disposal-circuit part, change it into an image, and are sent out to an optical fiber FB.

[0024] Thus, it is as follows when actuation of the digital-disposal-circuit part of the real-time title display HUD equipment of constituted this invention is explained. If the user of HUD equipment carries equipment, connects an optical fiber FB with a signal cable CB and combines the HUD part and the digital-disposal-circuit section of HUD equipment, the sound signal collected by the micro horn MH attached in the shank BO of glasses will be inputted into the voice recognition unit A of the digital-disposal-circuit section through a signal cable CB. A voice recognition unit A changes a sound signal into an alphabetic signal (text data), and sends it out to the output terminal.

[0025] Since the circuit which changes the sound signal of a voice recognition unit A into an alphabetic signal is the same as that of what is used for a current general one, a concrete circuit is omitted, but in order to perform real-time processing of the signal which does not have a time lag if possible on the property of this invention, it is required to use the circuit which can perform high-speed processing. The text data of the alphabetic signal of the output of a voice recognition unit A is impressed to the input terminal of automatic

translation equipment T, and by the function of automatic translation equipment, the language of the text data which is text is translated into other language set up beforehand, and it sends it out to the output terminal as text data of the language.

[0026] The text data of the language with which the output of automatic translation equipment T was translated is added to the input terminal of the picture signal transducer B. The text data of the automatic translation equipment T added to the input terminal of the picture signal transducer B is changed into an image by the liquid crystal display 2. The image of a liquid crystal display 2 is irradiated on the diffusion plate 3 by the light of the light source 1.

[0027] The diffusion plate 3 is used, in order that the noise of the image of a liquid crystal display 2 may be removed and a user may enable it to see a good image. The contraction optical system 4 for fiber coupling contracts to the magnitude of the path of an optical fiber FB, and the light which carried out outgoing radiation of the diffusion plate 3 is sent out to an optical fiber FB.

[0028] The specification of the optical fiber FB used here is the same as the thing of the example of aforementioned drawing 2. After focus adjustment is carried out with the lens AL for sight adjustment attached in the shank BO of the glasses of a HUD part, incidence of the image conducted with the optical fiber FB is carried out to holographic KOSHIBAINA HC. The function of the holographic combiner used here and the quality of the material are the same as the thing of the example of aforementioned drawing 2.

[0029] For this reason, an observer can also see the vision information on surrounding to coincidence, looking at the image of a liquid crystal display in one color (for example, green). However, the spectrum of the transmitted light lacks the green color. Moreover, an image only with the core size of a plastics fiber is expanded to an observer to visual field sufficient by showing a virtual image according to the augmentation operation. The holographic combiner HC is attached in the liquid crystal shutter of the lens of glasses, and has controlled the strength of the vision information on surrounding by this liquid crystal shutter.

[0030] For this reason, the user of the HUD equipment with a speech recognition function of this invention can see on some lenses of \*\*\*\*\* as text by the language into which the speech information of the front face of HUD equipment was translated. Thus, the alphabetic character translated since the so-called real-time title display function which changes and displays the voice of a foreign language on the alphabetic data of a native language is realizable according to this invention while hearing his voice and surrounding \*\*\*\*, and while looking at front scenery can be read.

[0031] For this reason, [0032] which can consider the approach of many activities, such as use in the art gallery and museum where the simultaneous translation function in an international congress, the opera of a foreign language and appreciation of a movie, and description in foreign country language are flowing

[Effect of the Invention] So that more clearly than the above explanation the HUD equipment with a speech recognition function of this invention The voice data which collected the sound with sound-collecting equipment is changed into text data with a voice recognition unit. The one section or all of the equipment which changes into an image the data signal which carries out the real-time display of the alphabetic data is separated from an image (alphabetic character) display on a space target. Since it joins together using the optical fiber tube which performs the transfer by the image itself and the meantime was displayed on the display unit, a hearing-impaired person's powerful communication tool is realizable.

[0033] Moreover, the thing for which automatic translation equipment is built into the HUD equipment with a speech recognition function of this invention. The alphabetic character translated since the so-called real-time title display function which changes and displays the voice of a foreign language on the alphabetic data of a native language is realizable while hearing his voice and surrounding \*\*\*\*, and while looking at front scenery can be read. For this reason, the approach of many activities, such as use in the art gallery and museum where the simultaneous translation function in an international congress, the opera of a foreign language and appreciation of a movie, and description in foreign country language are flowing, can be considered.

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CLAIMS

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[Claim(s)]

[Claim 1] HUD equipment with a speech recognition function which has sound-collecting equipment (microphone), a voice recognition unit, and equipment that changes a data signal into an image, changes into text data the voice data which collected the sound with sound-collecting equipment with a voice recognition unit, changes the data into an image for a data signal in the real time with the equipment changed into an image, and is characterized by what is displayed [claim 2] the HUD equipment with a speech recognition function characterize by to separate from an image ( alphabetic character ) display the one section or all of the equipment which have sound-collecting equipment ( a microphone ) , a voice recognition unit , and equipment that change a data signal into an image , change into text data the voice data which collected a sound with sound-collecting equipment with a voice recognition unit , change the data into an image in the real time , and change a data signal into an image on a space target , and to combine and display the meantime using the optical fiber tube which perform the transfer by the image itself .

[Claim 3] The HUD equipment [claim 4] with a speech-recognition function characterized by to have sound-collecting equipment (microphone), a voice recognition unit, automatic-translation equipment, and equipment that changes a data signal into an image, to change into text data the voice data which collected the sound with sound-collecting equipment with a voice recognition unit, to change the data into the text data of foreign country language with automatic-translation equipment, to change a data signal into an image in the real time with the equipment changed into an image, and to display the data It has sound-collecting equipment (microphone), a voice recognition unit, automatic translation equipment, and equipment that changes a data signal into an image. Change into text data the voice data which collected the sound with sound-collecting equipment with a voice recognition unit, and the data is changed into the text information on foreign country language with automatic translation equipment. HUD equipment with a speech recognition function which separates from an image (alphabetic character) display the one section or all of the equipment which changes a data signal into an image on a space target, combines the meantime using the optical fiber tube which performs the transfer by the image itself, and is characterized by what is displayed [claim 5] Claim 1 characterized by allotting virtual-image optical system to the image display section, and being able to observe an expansion image, claim 2, claim 3, HUD equipment with a speech recognition function according to claim 4.

[Claim 6] Claim 1 which used the half mirror for the image display section, compounded a display image and front scenery, and enabled coincidence observation, claim 2, claim 3, claim 4, turning-the-head-up HUD equipment with a speech recognition function according to claim 5.

[Claim 7] Claim 1 which specifies the generating location or direction of a sound source, and is characterized by displaying the location and a direction on the image display section with an image and text by equipping two or more sound-collecting equipments (microphone), claim 2, claim 3, claim 4, claim 5, turning-the-head-up HUD equipment with a speech recognition function according to claim 6.

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